

## **REMARKS**

The Office Action dated November 25, 2011, has been received and carefully considered. In this response, claim 1 has been amended. No new matter has been added. Entry of the amendments to claim 1 is respectfully requested. Reconsideration of the pending objections/rejections in the present application is also respectfully requested based on the following remarks.<sup>1</sup>

At the outset, Applicants respectfully submit that the amendments presented in this response should not be construed as an admission that the claims as previously presented are not patentable, or that the cited references anticipate or render obvious the claims as previously presented. Indeed, Applicants respectfully submit that the claims as previously presented, and/or further amendments thereto, also contain patentable subject material. Thus, Applicants reserve the right to pursue the claims as previously presented, and/or further amendments thereto, in one or more continuation applications.

### **I. THE OBJECTION TO THE DRAWINGS**

In paragraph 1 of the Office Action, the drawings were objected to under 37 CFR § 1.83(a) as not showing every feature of the claimed invention. Specifically, the Examiner asserts that the step of modulating the subcarrier modulation signal with the carrier signal, as recited in claim 1, must be shown. This objection is hereby respectfully traversed.

Firstly, Applicants note that claim 1 recites “modulating the carrier signal by at least one subcarrier modulation signal” as opposed to the Examiner’s stated modulation of the “subcarrier modulation signal with the carrier signal.” Nevertheless, modulation or mixing, via, for example, multiplication, is commutative, that is, the net result of  $a.b$  is the same as  $b.a$  in general.

Secondly, the modulation that takes place in the embodiments shown comprises mixing of the carrier signal,  $\cos(\omega_1 t)$  and/or  $\sin(\omega_1 t)$ , and the subcarrier modulation signal 1408 and/or 1410

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<sup>1</sup> As Applicants’ remarks with respect to the Examiner’s rejections are sufficient to overcome these rejections, Applicants’ silence as to assertions made by the Examiner in the Office Action or certain requirements that may be applicable to such rejections (e.g., assertions regarding dependent claims, whether a reference constitutes prior art, whether references are legally combinable for obviousness purposes) is not a concession by Applicants that such assertions are accurate or such requirements have been met, and Applicants reserve the right to analyze and dispute such in the future.

(as part of a combination of a ranging code,  $g_i(t)$  and/or  $m_i(t)$  and the subcarrier modulation signal 1408 and/or 1410) to produce signals 1412 and/or 1414, via a mixer 1416 and/or 1418, all of which is shown in Figure 14 and described on page 15, line 11 *et seq.*

Thirdly, the equation in Figure 14 expresses the above succinctly.

Accordingly, Applicants' view is that an embodiment of the modulation objected to by the Examiner is shown in the drawings, described in the application in terms of text and also expressed mathematically in Figure 14. However, it will also be appreciated that the Examiner's comments are rendered moot by the amendments to claim 1 as indicated above and discussed below.

In view of the foregoing, Applicants respectfully request that the aforementioned objection to the drawings be withdrawn.

## II. THE OBVIOUSNESS REJECTION OF CLAIMS 1, 4, 13-22, 98, AND 99

In paragraph 2 of the Office Action, claims 1, 4, 13-22, 98, and 99 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' Background of the Invention ("ABI") in view of U.S. Patent Application Publication No. US2002/0164949A1 to Beech et al. ("Beech"). This rejection is hereby respectfully traversed.

Under 35 U.S.C. § 103, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. In re Fine, 837 F.2d 1071, 1074 (Fed. Cir. 1988). There are four separate factual inquiries to consider in making an obviousness determination: (1) the scope and content of the prior art; (2) the level of ordinary skill in the field of the invention; (3) the differences between the claimed invention and the prior art; and (4) the existence of any objective evidence, or "secondary considerations," of non-obviousness. Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966); see also KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727 (2007). An "expansive and flexible approach" should be applied when determining obviousness based on a combination of prior art references. KSR, 127 S. Ct. at 1739. However, a claimed invention combining multiple known elements is not rendered obvious simply because each element was known independently in the prior art. Id. at 1741. Rather, there must still be some "reason that would have prompted" a person of ordinary skill in the art to combine the elements in the specific way that he or she did. Id.; In re Icon Health & Fitness, Inc., 496 F.3d 1374, 1380 (Fed. Cir. 2007). Also, modification of a prior art reference may

be obvious only if there exists a reason that would have prompted a person of ordinary skill to make the change. KSR, 127 S. Ct. at 1740-41.

Regarding claim 1, the Examiner asserts that the claimed invention would have been obvious in view of ABI and Beech. Applicants respectfully disagree. However, in order to forward the present application toward allowance, Applicants have amended claim 1 to more specifically define the claimed invention, and specifically those features that further differentiate the claimed invention from ABI and Beech, as well as the other cited references. In particular, Applicants respectfully submit that ABI and Beech, either alone or in combination, fail to disclose, or even suggest, a method of generating a navigation transmission signal in a navigation system comprising a carrier signal, a ranging code, and at least one subcarrier modulation signal, the method comprising the step of modulating the carrier signal by the at least one subcarrier modulation signal and the ranging code to generate the navigation transmission signal; wherein the at least one subcarrier modulation signal comprises a number, m, of amplitude levels, where m > 2, as presently claimed. In contrast, as the Examiner acknowledges, ABI does not disclose an m-level subcarrier modulation signal, where  $m > 2$ . Also, Beech similarly fails to disclose this claimed feature, as well as others. Specifically, Beech is concerned with digital communications, which as Applicants have previously indicated in prior responses, is a different technical field to navigation systems. Therefore, Beech cannot disclose a method of “generating a navigation transmission signal.” Also, Beech does not disclose using a ranging code at all. Therefore, Beech cannot disclose “generating a navigation signal comprising a... ranging code” and Beech cannot disclose modulating the carrier signal by ... said ranging code.” Furthermore, it should be noted that claim 1 comprises three entities; namely, (a) a navigation transmission signal, (b) a ranging code, and (c) at least one subcarrier modulation signal. Each of the above entities are comprehensively described in the present application with reference to, for example, the equations given on pages 2 and 3 of the present application.

It can be appreciated that embodiments of “a navigation transmission signal” are given in the forms of, for example,  $S_{L1_i}(t)$ , and  $S_{L2_i}(t)$ . Embodiments of “a ranging code” are given in the form of, for example,  $p_i(t)$  and  $c_i(t)$ , where  $p_i(t)$  represents the P(Y) ranging code and  $c_i(t)$  represents the CA ranging code. It is noted on page 3 of the present application that “[it] is known to further

modulate the ranging codes using a subcarrier.” Embodiments of subcarriers are described on page 3. For example,  $sc_{im}(t)$  is a subcarrier signal, or, to use the nomenclature of the claims, “a subcarrier modulation signal,” for the m-code. Also,  $sc_{ig}(t)$  is a subcarrier modulation signal for the coarse acquisition code. Also shown in the equations of pages 2 and 3 is a data signal that is represented by  $d_i(t)$ . Importantly, the data signal is a distinct and separate entity to the above described signal components.

In any assessment of novelty, it is imperative that one compares like with like. In performing such a comparison, it can be appreciated that Beech discloses a “digital data transmission link, particularly a satellite transmission link” for satellite communications. However, the signal that is output by, for example, antenna 26 is a satellite communications link. It is not a navigation signal.

It can also be appreciated that Beech does not disclose any ranging codes, which is expected because Beech lies in the field of communications and not in the field of navigation. Therefore, Beech cannot disclose “a ranging code.”

It can further be appreciated that Beech discloses a data signal, as can be seen from, for example, Figure 2, relied upon by the Examiner taken in conjunction with, for example, paragraph [0044], which discloses “...a modulator 19 [having] an input 18 for receiving a stream of data bits...” It is essential that Beech uses a data signal since transmitting data is its reason for existence. Beech indicates that the data can be modulated using a number of modulation techniques such as, for example, those listed in claim 8 or in paragraph [0029]. It is noted that QAM is among the modulation techniques listed.

However, it can additionally be appreciated that embodiments of the present application use a still further entity in producing the “navigation signal,” that is, embodiments use a “subcarrier modulation signal.”

One skilled in the art appreciates that the navigation signal, ranging code, and data signal are distinct and separate entities between and amongst themselves and that they are distinct and separate as compared to the subcarrier modulation signal. Therefore, Beech does not disclose a subcarrier modulation signal at all, when properly construed in context and cannot, therefore, disclose

modulating a carrier using a subcarrier modulation signal. Beech discloses a QAM data signal, which as indicated above, is a different entity to a subcarrier modulation signal. Still further, Beech cannot, therefore, disclose a multi-level subcarrier modulation signal and for a stronger reason cannot disclose such a signal having more than two levels. As indicated, the QAM signal is a data signal and is not a subcarrier modulation signal.

At this point, it is noted that the Examiner in essence asserts that QAM signals are known and therefore it would have been obvious to modify the teaching in the introductory portion of the present application to make the subcarrier modulation signal a QAM signal “as it would have enabled transmission to be carried out at higher bit rate[s] so as to allow [a] greater number of channels to be carried within a predefined bandwidth as taught by Beech et al. see para. 0004, last 4 lines.” However, the Examiner’s argument is ill-conceived for a number of reasons as follows.

First, when directing his mind to improvements in navigation, one skilled in the art is not concerned with increasing the data rate or number of channels in navigation systems. Indeed, the data rate of the data signal in navigation systems is extremely low, of the order of 50 bits per second. Increasing the data rate risks introducing significant adverse effects on the power spectrum of the navigation signal. Therefore, one skilled in the art would not find paragraph [0004] cited by the Examiner as providing any technical motivation for modifying the teaching of the background of the present application to use QAM signals when seeking to improve the navigation performance of a navigation signal or system. One skilled in the art of navigation systems is not concerned with increasing the number of channels since such a motivation belongs to the field of communications as opposed to navigation systems. This is why paragraph [0004] is in Beech; it is a communication system rather than a navigation system.

Second, even if one skilled in the art combined the background to the invention with Beech, it would not lead to the claimed invention. It is clear that any such combination would lead to one skilled in the art using QAM modulation to represent the data of the data signal,  $d_i(t)$ , described at line 15 of page 2, or lines 14 and 15 of page 3, of the present application. Such a combination would yield a conventional navigation system with a higher data rate due to the modulation used to represent the data. It would not lead to a multi-level subcarrier since Beech contains no motivation for modifying the subcarrier; Beech only contains a motivation for modifying the data signal.

Third, there exists a technical disincentive that operates to prevent or at least dissuade one skilled in the art from modifying the subcarrier signal to make it a QAM signal. One skilled in the art understands that GPS signals are spread spectrum signals that are spread to below the noise floor and that subsequently need to be raised again by correlation techniques. In contrast, the Examiner has relied upon the narrowband motivation of increasing the number of channels of Beech as a reason for modifying the background section of Applicants' specification. It can be appreciated that such a modification to the subcarrier would create a narrowband system, which is contrary to the well-established spread spectrum approach of current GPS systems. Therefore, the narrowband teaching of Beech relied upon by the Examiner in developing the obviousness assertion counsels one skilled in the art away from a technical perspective from the presently claimed invention to the extent that one skilled in the art would not have found it obvious to modify the background section of Applicants' specification to introduce an m-level subcarrier, where  $m > 2$ .

At this point, Applicants respectfully note that, as stated in MPEP § 2143.03, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981 (CCPA 1974). That is, “[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.” In re Wilson, 424 F.2d 1382 (CCPA 1970). Also, as stated in MPEP § 2143.01, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 (Fed. Cir. 1984). Further, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. In re Ratti, 270 F.2d 810 (CCPA 1959). Additionally, as stated in MPEP § 2141.02, in determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. Distilling an invention down to the “gist” or “thrust” of an invention disregards the requirement of analyzing the subject matter “as a whole.” W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Furthermore, as stated in MPEP § 2141.02, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away

from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). As confirmed in MPEP § 2145, it is improper to combine references where the references teach away from their combination. In re Grasselli, 713 F.2d 731 (Fed. Cir. 1983).

In view of the foregoing, Applicants respectfully submit that claim 1 cannot be obvious taking the background section of Applicants' specification in view of Beech. Thus, it can be appreciated that claim 1 is novel and inventive over the background section of Applicants' specification in view of Beech. Accordingly, Applicant respectfully submits that claim 1 should be allowable over ABI and Beech.

Regarding claims 4, 13-22, 98, and 99, these claims are dependent upon independent claim 1. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071 (Fed. Cir. 1988). Thus, since independent claim 1 should be allowable as discussed above, claims 4, 13-22, 98, and 99 should also be allowable at least by virtue of their dependency on independent claim 1. Moreover, these claims recite additional features which are not disclosed, or even suggested, by the cited references taken either alone or in combination.

In view of the foregoing, Applicants respectfully request that the aforementioned obviousness rejection of claims 1, 4, 13-22, 98, and 99 be withdrawn.

### III. THE OBVIOUSNESS REJECTION OF CLAIMS 5-7

In paragraph 3 of the Office Action, claims 5-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' Background of the Invention ("ABI") in view of U.S. Patent Application Publication No. US2002/0164949A1 to Beech et al. ("Beech") and further in view of U.S. Patent Application Publication No. US2002/0070799A1 to Dahan et al. ("Dahan"). This rejection is hereby respectfully traversed.

Applicants respectfully submit that the aforementioned obviousness rejection of claims 5-7 has become moot in view of the deficiencies of the primary references (i.e., ABI and Beech) as discussed above with respect to independent claim 1. That is, claims 5-7 are dependent upon independent claim 1 and thus inherently incorporate all of the limitations of independent claim 1.

Also, the secondary reference (i.e., Dahan) fails to disclose, or even suggest, the deficiencies of the primary references as discussed above with respect to independent claim 1. Indeed, the Examiner does not even assert such. Thus, the combination of the secondary reference with the primary references also fails to disclose, or even suggest, the deficiencies of the primary references as discussed above with respect to independent claim 1. Accordingly, claims 5-7 should be allowable over the combination of the secondary reference with the primary references at least by virtue of their dependency on independent claim 1. Moreover, claims 5-7 recite additional features which are not disclosed, or even suggested, by the cited references taken either alone or in combination.

In view of the foregoing, Applicants respectfully request that the aforementioned obviousness rejection of claims 5-7 be withdrawn.

#### IV. THE OBVIOUSNESS REJECTION OF CLAIMS 8 AND 10-12

In paragraph 4 of the Office Action, claims 8 and 10-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' Background of the Invention ("ABI") in view of U.S. Patent Application Publication No. US2002/0164949A1 to Beech et al. ("Beech") and further in view of U.S. Patent Application Publication No. US2003/0141938A1 to Poklemba et al. ("Poklemba"). This rejection is hereby respectfully traversed.

Applicants respectfully submit that the aforementioned obviousness rejection of claims 8 and 10-12 has become moot in view of the deficiencies of the primary references (i.e., ABI and Beech) as discussed above with respect to independent claim 1. That is, claims 8 and 10-12 are dependent upon independent claim 1 and thus inherently incorporate all of the limitations of independent claim 1. Also, the secondary reference (i.e., Poklemba) fails to disclose, or even suggest, the deficiencies of the primary references as discussed above with respect to independent claim 1. Indeed, the Examiner does not even assert such. Thus, the combination of the secondary reference with the primary references also fails to disclose, or even suggest, the deficiencies of the primary references as discussed above with respect to independent claim 1. Accordingly, claims 8 and 10-12 should be allowable over the combination of the secondary reference with the primary references at least by virtue of their dependency on independent claim 1. Moreover, claims 8 and

10-12 recite additional features which are not disclosed, or even suggested, by the cited references taken either alone or in combination.

In view of the foregoing, Applicants respectfully request that the aforementioned obviousness rejection of claims 8 and 10-12 be withdrawn.

**V. THE EXAMINER'S COMMENT**

In paragraph 5 of the Office Action, the Examiner notes that a copy of the information incorporated by reference in the specification at page 7, lines 4-5 and line 13, was not submitted in accordance with 37 CFR § 1.57. However, Applicant notes that the information (i.e., the article by Pratt et al., the inventors of the presently claimed invention) was submitted in an Information Disclosure Statement filed November 25, 2009, and considered by the Examiner on December 22, 2009. The copy of the article submitted with the IDS consists of the same material incorporated by reference in the specification.

**VI. CONCLUSION**

In view of the foregoing, Applicants respectfully submit that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made.

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Amendment dated April 25, 2012  
Reply to Office Action of November 25, 2011

Docket No.: 2001145.00120US1

Applicants believe no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 08-0219, under Order No. 2001145.00120US1 from which the undersigned is authorized to draw.

Respectfully submitted,

Dated: April 25, 2012

\_\_\_\_/Thomas E. Anderson/\_\_\_\_  
Thomas E. Anderson  
Registration No.: 37,063  
Attorney for Applicant(s)

Wilmer Cutler Pickering Hale and Dorr LLP  
1875 Pennsylvania Avenue, NW  
Washington, DC 20006  
(202) 663-6000 (telephone)  
(202) 663-6363 (facsimile)